REMARKS

The above amendments to the above-captioned application along with the following remarks are being submitted as a full and complete response to the Office Action dated May 28, 2004. In view of the above amendments and the following remarks, the Examiner is respectfully requested to give due reconsideration to this application, to indicate the allowability of the claims, and to pass this case to issue.

Status of the Claims

As outlined above, claims 13 - 31 are pending in the application, wherein claims 13, 15, 22, 24, 27 and 29 are being amended to more particularly point out and distinctly claim the subject invention. Claims 1 - 12 were previously canceled without prejudice or disclaimer. Applicants submit that no new matter is being introduced through the submission of this supplemental response.

Features of the Invention

The present invention as recited in claim 13 is directed to a magnetic recording system for perpendicular recording hard disk drives, comprising: a magnetic head for recording and reproducing information; and a perpendicular magnetic recording medium having a perpendicular magnetic recording layer, and a soft magnetic underlayer. The perpendicular magnetic recording layer has a burst area, the burst area having a first area with a burst signal recorded therein for positioning the magnetic head, and a second area with a dummy signal recorded therein. A bit length of the dummy signal is less than a bit length of the burst signal.

According to claim 15, the present invention is directed to a magnetic recording system for perpendicular recording hard disk drives, comprising: a magnetic head for recording and reproducing information; and a perpendicular magnetic recording medium having a perpendicular magnetic recording layer, and a soft magnetic underlayer. The perpendicular magnetic recording layer has a burst area, the burst area having a first area with a burst signal recorded therein for positioning the magnetic head, and a second area with a dummy signal recorded therein. The burst area is formed with a bit length of the dummy signal less than a bit length of the burst signal, such that the burst signal is extractable from the burst area.

According to claim 22, the present invention is directed to a magnetic recording

system for perpendicular recording hard disk drives, comprising: a magnetic head for recording and reproducing information, and a perpendicular magnetic recording medium having a perpendicular magnetic recording layer, and a soft magnetic underlayer. The perpendicular magnetic recording layer has a burst area, the burst area having a first area with a burst signal recorded therein for positioning the magnetic head, and a second area with a dummy signal recorded therein. A frequency of the dummy signal is higher than a frequency of the burst signal.

According to claim 24, the present invention is directed to a magnetic recording system for perpendicular recording hard disk drives, comprising: a magnetic head for recording and reproducing information, and a perpendicular magnetic recording medium having a perpendicular magnetic recording layer, and a soft magnetic underlayer. The perpendicular magnetic recording layer has a burst area, the burst area having a first area with a burst signal recorded therein for positioning the magnetic head, and a second area with a dummy signal recorded therein. The burst area is formed with a frequency of the dummy signal higher than a frequency of the burst signal, such that the burst signal is extractable from the burst area.

According to claim 27, the present invention is directed to a magnetic recording system for perpendicular recording hard disk drives, comprising: a magnetic head for recording and reproducing information, and a perpendicular magnetic recording medium having a perpendicular magnetic recording layer, and a soft magnetic underlayer. The perpendicular magnetic recording layer has a burst area, the burst area having a first area with a burst signal recorded therein for positioning the magnetic head, and a second area with a dummy signal recorded therein. A recording density of the dummy signal is higher than a recording density of the burst signal.

Lastly, the present invention as recited in claim 29 is directed to a magnetic recording system for perpendicular recording hard disk drives, comprising: a magnetic head for recording and reproducing information; and a perpendicular magnetic recording medium having a perpendicular magnetic recording layer, and a soft magnetic underlayer. The perpendicular magnetic recording layer having a burst area, the burst area having a first area with a burst signal recorded therein for positioning the magnetic head, and a second area with a dummy signal recorded therein. The burst area is formed with a recording density of the dummy signal less than a recording density of the burst signal, such that the burst signal is extractable from the burst area.

Support for the above-outlined claims and the amendments made thereto may be found on at least p. 8, lines 3 - 5 of the specification.

Prior Art Rejection

As discussed in the previously filed response, claims 13 - 15, 17, 22 - 25 and 27 - 30 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,731,446 to Ikeda et al. (hereinafter "Ikeda") in view of U.S. Patent No. 6,025,970 to Cheung (hereinafter "Cheung"), and claims 26 and 31 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Ikeda in view of Cheung, and further in view of U.S. Patent No. 6,490,111 to Sacks (hereinafter "Sacks"). These rejections have been carefully considered, but are again most respectfully traversed. The following discussion of the prior art refers to the explanatory drawings entitled "3. Thermal Stability", which were filed with the response of March 5, 2004, to help explain the problems of the perpendicular magnetic recording systems.

In the prior art as explained in the specification of the above-referenced application, conventional longitudinal magnetic recording systems have no response to DC magnetization (see Figs. 19(a) and 19 (b)). In contrast, conventional perpendicular magnetic recording systems, including a soft magnetic underlayer and a perpendicular magnetic recording layer, exhibit a response to DC magnetization as shown in Figs. 19(c) and 19(d).

There is a problem unique to conventional perpendicular magnetic recording systems with the double-layer perpendicular recording medium in that, if the system employs a burst area structure (see Fig. 2) as well as the longitudinal magnetic recording system, it has a response to the DC magnetization of the DC-erased area (area II) and the reproduced waveform includes the DC offset. This causes an incorrect representation of the burst amplitude level (Fig. 21; page 7, line 24 to page 8, line 15).

Another problem with conventional perpendicular magnetic recording systems is that, if the system also employs a burst area structure (see Fig. 2), the DC erased area (area II) has the same structure as the long wavelength bit (i.e., bit length is long) and the demagnetization field largely affects the burst area (area I). Consequently, this promotes thermal demagnetization (see page 8, line 24 to page 9, line 10).

The present invention as claimed is directed to overcoming these problems in the prior art. Specifically, the present invention uses a perpendicular magnetic recording medium having a soft magnetic underlayer and a perpendicular magnetic recording layer. The

structure of the present invention is formed with a first area with a burst signal and a second area with a dummy signal for the burst area, wherein the relationship between the signals of burst area is based on certain characteristics (i.e., the bit length, the frequency or the recording density) as recited in claims 13, 15, 22, 24, 27 and 29.

In such structures, the dummy signal recorded on the second area has a bit length shorter than, a frequency higher than, or a recording density higher than the corresponding characteristic of the burst signal recorded on the first area. The reproduced amplitude of the dummy signal recorded on the second area is almost zero and it prevents to be affected by the DC-offset (see page 10, lines 15 - 21).

Further, in such structure, the second area records the short wavelength bits (i.e., the bit length is short). It reduces the demagnetization field in the second area and improves the anti-signal decay performance (see page 10, lines 7 - 14).

As noted in the previously filed response, the reference of Ikeda cannot be properly cited as prior art against the present invention. As such, there is no primary prior art reference available that can be combined with the secondary reference to Cheung and the tertiary reference to Sacks so as to be cited against the present invention as claimed.

Even more, Cheung and Sacks, either by themselves or in combination with one another, fail to provide any sufficient teaching, disclosure, or suggestion to embody each and every feature of the present invention as claimed. In particular, Cheung does not disclose, teach or suggest a perpendicular magnetic recording medium having a soft magnetic underlayer and a perpendicular magnetic recording layer. Accordingly, Cheung does. not address any problem asociated with a perpendicular magnetic recording medium as mentioned above.

Rather, the disk 402 of Cheung employs a longitudinal magnetic recording system and does not have a soft magnetic underlayer nor a perpendicular magnetic recording layer. Accordingly, the disk would exhibit no response to DC magnetization. Applicants would contend that it is not appropriate to apply Cheung's servo pattern of the longitudinal magnetic recording system to the servo pattern of a perpendicular magnetic recording medium with double-layers.

Further, in Cheung, both of its Al (fl frequency burst components) and A2 (f2 frequency burst components) are used as position error sensing signals. In contrast, in the present invention, the burst signal recorded on the first area is used as the head position signal, but the dummy signal recorded on the second area is not used as the head position

signal. Applicants will argue that such a structure is considerably different from that of Cheung.

In the present invention, the dummy signal is shorter in bit length than the burst signal (for example, claim 13) and the burst signal is shorter in bit length than the user data signal (for example, claim 18). The dummy signal is shorter in bit length than the burst signal and the user data signal and it does not reach the reproduced amplitude level that can be detected as the head position signal.

All in all, the Cheung reference falls far short of either anticipating or rendering obvious each and every feature of the present invention as claimed. Sacks by itself falls far short of providing sufficient teaching to make up for the absence of a primary reference, as well for the deficiencies in the secondary reference to Cheung. The present invention as a whole is distinguishable and thereby allowable over the prior art.

Conclusion

In view of all the above, Applicants respectfully submit that the present invention as now claimed and as a whole is distinguishable, and thereby allowable over the prior art.

Favorable reconsideration of this application as amended is respectfully solicited. Should there be any outstanding issues requiring discussion that would further the prosecution and allowance of the above-captioned application, the Examiner is invited to contact the Applicant's undersigned representative at the address and phone number indicated below.

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